

# COMPLETE LUBRICATION SOLUTIONS FROM **SERVO**® - MINING EQUIPMENT



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## LUBRICANTS FOR THE MINING SECTOR

Mining has undergone an important change during the 20th century with a shift from underground to open pit mining techniques.

In mining, the extraction of minerals goes on around the clock. Consequently, components such as bearings, pins, bushes, ropes and gears in mills, shovels or trucks are incessantly subject to friction and wear. Abrasive contamination, exceptional temperatures, oscillating movements and extremely high loads are additional factors that your equipment handles day after day.

Selecting the right lubricant is essential since it acts as a technical barrier protecting your equipment whilst enabling higher machine reliability. An incorrectly selected lubricant may lead to premature failure of a component and in the worst case



production stoppages, entailing high maintenance costs and loss of production. With the correct lubricant, service life of the lubricated components and availability of machines can be extended. Lower lubricant and energy consumption also have a positive effect on the operating costs.

With its long history of working with the mining industry, **SERVO** has a wide range of products and services aimed at reducing maintenance costs, increasing machine life and reducing fuel costs.



## INDUSTRIAL GEAR OILS

The mining industry operating conditions include heavy loads, shock loads, temperature extremes and constant presence of contaminants.

**SERVO** industrial gear oils (mineral as well as synthetic) provide superb wear protection against shock loading, superior anti-foaming, outstanding water separation, prevents rust and corrosion, superior compatibility with

bearing & gear metallurgies which extends the life of the gear oil as well as that of the gearbox.



### SERVO Industrial Gear Oils

Performance at a Glance			
Product	Wear Protection	Long Oil Life	Equipment Efficiency
Servomesh Gold Oils*	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆
Servomesh XP Oils	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆
Servomesh Plus Oils	☆☆☆☆	☆☆☆☆	☆☆☆
Servomesh EE Oils	☆☆☆	☆☆☆	☆☆☆
Servomesh SP Oils	☆☆	☆☆☆	☆☆

\*Approved by Flender-Siemens

Performance values are relative indication only

Product	Type	VI	Remarks
Servosyngear series	PAO	140 - 145	ISO VG 100 - 3200
Servosyngear HVI series	PAG	200 - 250	ISO VG 100 - 1000
Servosyngear Plus series*	PAO based Anti-Micropitting	145 - 150	ISO VG 220 - 680
Servosyngear AMP series	PAO based Anti-Micropitting	155 - 160	ISO VG 320 - 460

\*Approved by Flender-Siemens



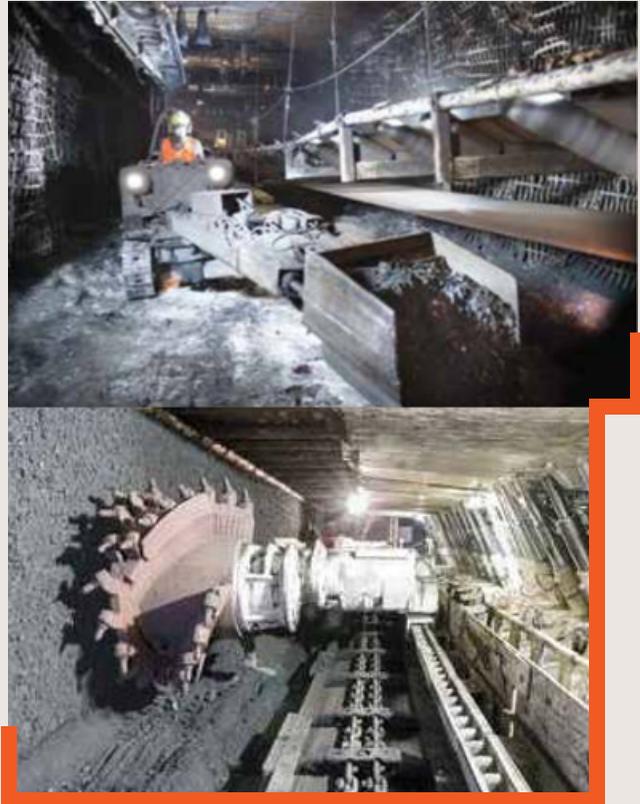
## FIRE-RESISTANT HYDRAULIC FLUIDS

Mineral oil is by far the most common base stock for hydraulic fluids because of its low cost, high performance and ease of use. Most mineral oil based hydraulic fluids have low flash/fire points (150-200°C). Hence, small leaks in a high pressure system that can produce a fine atomized spray capable of travelling a significant distance, pose risk of fluid ignition and fire. These can be mitigated by the use of FRHF that eliminates or significantly reduces this hazard.

Fire resistant hydraulic fluids have been developed for underground mining applications. These fluids have significantly higher temperatures or fire-resistant properties and thus afford better fire protection than mineral oils. FRHFs are classified by International Standards Organization (ISO 6743-4).

### SERVO Fire Resistant Hydraulic Fluids

Product	KIN. Viscosity CST at 40°C	Auto Ignition Temp, °C
Servoaquol 250 (HFA type)	55 - 75	-
Servoaquol 750 (HFA type)	115 - 135	-
Servosystem HFB 68	62 - 74	-
Servofyress WG 46 (HFC type)	41 - 50	545
Servofyress WG 68 (HFC type)	61 - 74	545
Servofyress HFDU 46 ES	41 - 52	400
Servofyress HFDU 68 ES	61 - 74	400



## HEAVY DUTY ENGINES OILS FOR HEMMs

- Engines in mining operations are built to handle bigger loads under the most severe operating conditions while delivering the best fuel economy per ton. A wide variety of equipment operate through such engines. These engines routinely average above 95% uptime in mining operations where load factors commonly exceed 40%.
- Important factors to be considered while choosing an engine oil are:
  - Appropriate SAE viscosity, as recommended by OEM.
  - Adequate Performance Level as stipulated by API, ACEA, etc.

- Viscosity consistency at wide operating temperatures.
- Good TBN characteristics.
- Good soot dispersancy.
- Good wear protection.
- High thermal & oxidation stability to minimize oil thickening & sludge.
- Long oil drain, typically 500-1000 hours.
- Fuel economy improvement, without sacrificing durability.





## SERVO Heavy Duty Engine Oils

Product	Specification	Salient Features
Servo Premium CF-4 15W-40	API CF-4, SAE 15W-40	250 hours drain
Servo Pride XL 15W-40	API CH-4, SAE 15W-40	500 hours drain
Servo Pride Supreme 15W-40	API CI-4, SAE 15W-40	500 hours drain, EGR compatible
Servo Pride Supreme Plus 15W-40	API CI-4 Plus, SAE 15W-40	500 hours drain, EGR compatible, higher soot dispersancy
Servo Pride XL Plus 15W-40	API CI-4 Plus, SAE 15W-40	500 hours drain, EGR compatible, excellent soot dispersancy, cummins approved
Servo Pride TH Plus 15W-40	API CI-4 Plus, SAE 15W-40, For Tata Hitachi Eqpt.	500 hours drain, EGR compatible, higher soot dispersancy, Tata Hitachi approved
Servo Pride Max 15W-40	API CJ-4, SAE 15W-40	Low SAPS, compatible with DPF, ULS HSD fuel
Servo Pride XL Plus 10W-40	API CI-4 Plus, SAE 10W-40	500-1000 hours drain, EGR compatible, excellent soot dispersancy, fuel economy
Servo Pride XL 10W-30	API CH-4, SAE 10W-30	500 hours drain, fuel economy grade
Servo Pride XL Plus 10W-30	API CI-4+, SAE 10W-30	500-1000 hours drain, EGR compatible, excellent soot dispersancy, fuel economy grade

### OILS FOR HEAVY DUTY TRANSMISSIONS & AXLES

- Unlike engine oils, there are no industry-wide standards for powershift transmission fluids. Instead, equipment manufacturer recommendations or fluid specifications, which owners and fleet managers must follow, drive performance.
- Some of the recent performance improvements that have resulted in new dedicated fluid technologies include:
  - Improved overall lubrication to protect against wear, micropitting & fatigue in clutches, wet brakes, pumps, planetary gears, and final drive gears & bearings.
  - Improved frictional stability to enhance clutch life, eliminate brake noise and provide operating efficiencies while moving heavy loads on inclines.
  - Compatibility of lubricants and machinery to combat negative effects on elastomers in rings and seals or with various metals.
- Oxidation and thermal stability to ensure that fluids will not degrade at high temperatures, maintaining fluid performance.
- Sludge control to reduce blockages within the system that prevent fluids from flowing where they are needed.
- Rust and corrosion protection to extend equipment life and improve performance.
- Foam protection to prevent foaming and the subsequent damage caused by wear due to foam.
- Minimized brake chatter to provide better wet brake control.
- Sustained film thickness to provide antiwear protection for gears.
- Shear stability control to maintain viscosity of the lubricant grade.





## SERVO Heavy Duty Transmission & Axle Oils

Application	Product	Specification	Salient Features
<b>TRANSMISSIONS</b>	Servo Transmission C4 SAE 30	Allison C4, SAE 30	1000 hours drain
	Servo Transmission XL 439	Allison TES 439,	>1000 hours drain, superior performance
	Servo Trans TH SAE 30	Tata Hitachi specs	1000 hours drain
	Mahindra Earthmaster Transmission Oil	Mahindra Earthmaster specs	1000 hours drain
	BEML ALS Transmission Oil	BEML specs (Allison Transmission)	1000-1500 hours drain
	Servo Transmission TO4 10/ 30	Caterpillar TO4 specs	1500 hours drain
	BEML Transmission Oil ET 30 CD	BEML specs (BEML Transmission)	1000-1500 hours drain
	Servo Gear Super LS 80W90	ZF Transmission	1000 hours drain limited slip applications
	Servo Gear Super LS 90	ZF Transmission, BEML specs	1000 hours drain limited slip applications
	Servo Ultra KB 10/30	Komatsu specs	1000 hours drain, suitable for wet brakes
Application	Product	Specification	Salient Features
<b>AXLES</b>	Servo Gear Super 85W-140	API GL-5	1000 hours drain
	Servo Gear HP 90/140	API GL-4, BEML specs	1000 hours drain
	Servo Gear Super 90/140	API GL-5, BEML specs	1000 hours drain
	Servo Gear TH 85W-140 LS	Tata Hitachi specs	1000 hours drain limited slip applications
	Servo Gear Super ALT 85W-140 LL	API GL-5, SAE 85W-140	Long life drain interval, upto 1500 hours
	Mahindra Earthmaster Rear Axle Oil	Mahindra Earthmaster specs	1000 hours drain



## HYDRAULIC OIL FOR MOBILE EQUIPMENTS

- Since there are no industry-wide standards for mobile hydraulic fluids, OEM recommendations, combined with fluid specifications, drive development and performance.
- It is a common practice in the construction and mining industries to use engine oil SAE 10, SAE 20 or SAE 30 with the lowest API rating as a substitute for hydraulic oil ISO 32, ISO 46 or ISO 68, respectively for hydraulic systems of heavy equipment.
- There is also a class of hydraulic fluids (DIN 51524) that contains dispersive and deterative additives much like engine oils. The use of these fluids is approved by many OEMs and can offer several advantages in mobile equipment such as preventing varnish, sludge and controlled emulsification.
- Some OEMs recommend using multi-grade oil in hydraulic systems for their mobile equipment. Viscosity index (VI) improves extend the operating temperature range for the fluids from cold starts to high-temperature operations. Multigrade oils with outstanding shear stability are the wave of the future as the equipment is able to perform work using less fuel, lowering the cost of operation.
- **SERVO** hydraulic oil are available under **SERVO** System HLP Series (VG 32, 46, 68, 100 & 150) premium AW hydraulic oils. The oil meets Denison HF-0 and DIN 51524 part-2 specs.
- Other variants of hydraulic oils include, **SERVO** Hydrex Series (VG 32, 46, 68 & 100) high viscosity index anti-wear hydraulic oil. It meets E & F specs and DIN 51524 Part-3 Specification. Hydrex series meets requirements of LT CEL excavators.
- **SERVO** Hydrex Plus Series formulated with group-3 base oils is ideal for long drain in high capacity excavators at 4500 hours as compared to the conventional oils with 1500 hours drain period.
- **SERVO** Hyvis EE 46 is formulated with DYNAVIS® technology which stands for 'more power' and 'less fuel'. With this fluid, users can count on 'increased productivity, fuel savings, better reliability and sustained performance from construction equipment'.



### SERVO Hydraulic Oils

Product	Specification	Salient Features
Servo Ultra KB10	Komatsu-BEML specs	1000 hours drain
BEML Hydraulic EH 10 CD	BEML specs (BEML Hydraulics)	1000-1500 hours drain, high antiwear protection
Servosystem HLP 46/68	DIN 51524 (part II),	1000 hours drain, excellent filterability and hydrolytic stability
Servosystem XLP 46 / 68	DIN 51524 (part II)	1200 hours drain, greater wear protection
Servo Hydrex TH 46 / 68 / 100	DIN 51524 (part III), High Viscosity Index	1500 hours drain
Servo Excavator TH 46	Tata Hitachi approved	1500 hours drain
Servo Hydro Supreme 10	Meets Caterpillar requirements	Long drain (3000 hours), extra wear protection, excellent filterability & hydrolytic stability
Servo Hydrex TH 46 Plus	DIN 51524 (part III), Very High Viscosity Index	4000 hours drain interval high performance oil
Servo Hyvis EE 46	DIN 51524 (part III), Extra High Viscosity Index	4000 hours drain interval, up to 12% fuel savings



## ENGINE COOLANTS

- Coolants are used to prevent freezing, corrosion and rust in cooling systems of HEMMs, as well as providing other useful functions. Using the correct coolant will have a significant beneficial impact on the life of engines, radiators and power trains.
- Antifreeze types can be classified into three basic categories: 1) inorganic-acid technology (IAT); 2) organic-acid technology (OAT); and 3) OAT variations; often called hybrids, hybrid-OATs, or HOATs.
- The most widely used antifreeze is 'fully formulated,' which uses an additive package consisting of inorganic compounds.
- OAT-type antifreeze, often called 'extended-life coolant' (ELC), uses additives made from neutralized versions of organic (carbon-containing) acids. Hybrids result when an OAT antifreeze also contains certain inorganic additives used in fully formulated form - such as nitrite, silicate or phosphate. A nitrite-containing OAT, for instance, is a NOAT.

### SERVO Engine Coolants

Product	Specification	Salient Features
Servo Kool HWC Servo Kool HWC 30 Servo Kool HWC 50	JISK-2234 specs	OAT technology, 700 ppm hard water compatible. Also available in ready to use @ 30% concentration and ready-to-use @ 50% concentration. Provides 1500 hours performance @ 50%.
BEML Antifreeze	BEML specs	Specially formulated for BEML excavators & dumpers. Provides >3000 hours performance.
Servo Kool HD Servo Kool HD 50	JISK-2234 specs	NOAT technology, offers excellent protection against Liner Cavitation. >3000 hours performance. Also available in ready-to-use @ 50% concentration.



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